

能源和环境工程

## 超声能量密度对污泥脱水性能的影响

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收稿日期 2009-8-10 修回日期 2009-9-20 网络版发布日期 2010-3-2 接受日期

**摘要** 本文主要考察了不同超声波能量密度对污泥脱水性能及结构的影响,并对相关机理进行了探讨。研究表明,在低能量密度下,污泥脱水性能随超声时间延长变化幅度不大;当能量密度提高到 $0.5 \text{ kW} \cdot \text{L}^{-1}$ 时,污泥脱水性能显著改善,在此能量密度下,超声时间为10 s时效果最优,泥饼含水率、比阻、粘度和CST分别为83.8%、 $0.8 \times 10^9 \text{ s}^2 \cdot \text{g}^{-1}$ 、16.8 mPa·s和10.7s;在高能量密度下,随着超声时间的延长,菌胶团破坏严重,污泥处于分散状态,造成过滤阻力增加,脱水性能恶化,当超声能量密度为 $4 \text{ kW} \cdot \text{L}^{-1}$ ,作用时间为120s时,泥饼含水率、比阻、粘度和CST分别为89.4%、 $3.1 \times 10^9 \text{ s}^2 \cdot \text{g}^{-1}$ 、43.2 mPa·s 和56.2s。

**关键词**

[超声波](#) [能量密度](#) [污泥](#) [脱水性能](#)

分类号

## Effect of ultrasonic energy density on sludge dewatering performance

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### Abstract

In this paper the effect of ultrasonic energy density on sludge dewatering performance was investigated and the related mechanism was discussed. Experimental results showed that time of ultrasonic action had little influence on sludge dewatering performance at the lower energy density. Sludge dewatering performance was improved when energy density increased from  $0.25 \text{ kW} \cdot \text{L}^{-1}$  to  $0.5 \text{ kW} \cdot \text{L}^{-1}$ . At the ultrasonic energy density of  $0.5 \text{ kW} \cdot \text{L}^{-1}$ , sludge dewatering performance reached the highest at the time of 10 s with mud cake water content 83.8%, specific resistance filtration (SRF)  $0.8 \times 10^9 \text{ s}^2 \cdot \text{g}^{-1}$ , viscosity 16.8 mPa·s and capillary suction time (CST) 10.7 s. At the higher energy density, sludge floc was destroyed and dispersed which resulted in the increase of filtration resistance and the deterioration of sludge dewatering performance. At the energy density of  $4 \text{ kW} \cdot \text{L}^{-1}$ , and time of ultrasonic action 120 s, mud cake water content, SRF, viscosity and CST were up to 89.4%,  $3.1 \times 10^9 \text{ s}^2 \cdot \text{g}^{-1}$ , 43.2 mPa·s and 56.2 s, respectively.

### Key words

[ultrasonic](#) [energy density](#) [sludge](#) [dewatering performance](#)

DOI:

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